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EXAMINER	
HUGHES, SCOTT A	
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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/693,298	Applicant(s) CHAMBERLAIN ET AL.	
	Examiner Scott A Hughes	Art Unit 3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *39-47,51,52,54 and 56-66* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *39-47,51,52,54 and 56-66* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10/25/2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/13/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 11/14/2006 have been fully considered but they are not persuasive.

Applicant argues that the external clock signal (H) from the GPS satellite is not an element of the Bary network. This argument is not persuasive, as the Bary network uses the signal in its network, and therefore incorporates the GPS satellite and clock signal (H) into its network. Since the signal is directly used by the devices of Bary, the GPS satellite and clock signal (H) are parts of the network. Applicant argues that the Bary reference does not teach master and assistant GPS receivers. This argument is not persuasive as the Bary reference in view of the cited Ericsson reference teaches master GPS receivers and assisted GPS receivers. The Ericsson reference gives motivation to use assisted GPS in the field devices (help recover a lost signal faster, minimize time of search for satellite signal, minimizes the power required to find a signal). Bary teaches a central control station that acts as a master station to the local acquisition units. Ericsson teaches that the master GPS is located in the central control station and that the assisted GPS receivers are located in the field units.

Applicant argues that the Bary reference teaches a different, conflicting use of the term synchronization signal. Applicant argues that Bary teaches a time break signal, and not a synchronization signal. This argument is not persuasive, as the claim does not state what type of synchronization signal must be used, and therefore the

signal of Bary is broadly interpreted as a synchronization signal since it is a signal that allows for the synchronization of the times and data taken by the devices.

Applicant argues that the Bary reference uses GPS receivers for timing signals and not for positioning, and that Bary makes no mention of satellite signal reception difficulty. Applicant argues that there would therefore be no motivation to combine the Bary reference with the Ericsson reference. This argument is not persuasive, as the Bary reference deals with GPS signals, and the Ericsson reference acknowledges problems in the field of GPS signals and discloses improvements that can be made by using assisted GPS receivers. Since Bary is using GPS signals, it would have been obvious to use the improvements of assisted GPS as taught by Ericsson. Bary requires a timing signal from GPS satellites in his system. The Ericsson reference specifically teaches a benefit that is obtained from assisted GPS when using GPS as a time reference (Ericsson, page 7 and specifically 1.1.5.5) by improving time to fix for all receiver and sensitivity for receivers in poor signal environments.

Applicant argues that the Ericsson reference is "art to which the present subject matter pertains" because it deals with telecommunications and the claims and Bary reference are drawn to seismic network systems. This argument is not persuasive because elements of both the claims and the Bary reference are telecommunication of data between units and GPS technology. Since GPS technology is part of the claims and prior art, art related to improvements in GPS technology is art to which the subject matter pertains. Since the Bary reference teaches using GPS signals as an integral part of the system, one of ordinary skill using the disclosure of Bary would want to make

sure to obtain the best GPS equipment that could be used to obtain these timing signals.

Applicant argues that the Ericsson reference teaches a best positioning accuracy of 5m and that seismologist would want accuracy of 1-3m. Applicant argues that the Ericsson reference therefore has no relevance to seismic survey networks. This argument is not persuasive, as the Ericsson reference was not stated to teach a modification to the Bary GPS system involving positioning signals. The Ericsson reference was cited as teaching a way to modify the GPS system of Bary as it relates to timing signals. Applicant's arguments that Ericsson teaches mobile units whereas the units of the seismic survey networks discussed are stationary are also not persuasive. The benefits discussed in Ericsson with regards to using GPS as a time reference do not depend on the device being a moving or stationary device. The timing benefits taught would apply to the stationary devices used in Bary, and therefore the Ericsson reference is relevant to the claims and the prior art cited. Ericsson teaches that positioning signals from the assisted GPS receivers are used to assist in satellite tracking.

Applicant argues that the Iseli reference teaches that data modules receiver seismic data exclusively from seismic sensors and not through the network are not persuasive. The data signals in Iseli may originate from sensors, but they are sent through the network of devices to the central recording station, and therefore are received and retransmitted from the data acquisition modules.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 39-41, 44-45, 51-52, and 56-66 are rejected under 35 U.S.C. 102(e) as being anticipated by Fenton (7117094).

With regard to claim 39, Fenton discloses a seismic survey network (abstract) (Figs. 1-2) comprising a plurality of data processing modules (DAU) and a central recording unit (Data Recording and Control); a first portion of said data processing modules including seismic data acquisition modules having a first clock means (received timing signal from slave GPS) and an assisted global positioning system (GPS) receiver 6 (Column 3, Line 10 to Column 4, Line 14; Column 5, Line 52 to Column 6, Line 67); said central recording unit having a second clock means and a master global positioning system (GPS) receiver 3 (Column 3, Line 10 to Column 4, Line 14; Column 5, Line 52 to Column 6, Line 67), each of said data acquisition modules having one or more seismic sensors 8 (Fig. 1) with respective specific identities operatively connected thereto for transmission of seismic data to the respective data acquisition module (Column 3, Lines 10-25; Column 5, Line 52 to Column 6, Line 60); said survey network further comprising a communication network

connected among said data processing modules and said central recording unit linking said master GPs receiver and said assisted GPS receivers (Figs. 1-2) (Column 3; Column 6), said master GPS receiver transmitting to said assisted GPS receiver over said communication network satellite tracking assistance data and current best-estimate data of said assisted GPS receiver location and said assisted GPS receiver transmitting to said master GPS receiver for processing and storage, over said communication network, satellite data collected by said assisted GPS receiver (Column 3, Line 10 to Column 5, Line 53; Column 6, Line 60 to Column 7, Line 36).

With regard to claim 40, Fenton discloses that the data acquisition modules include operational programs to receive and re-transmit digital seismic data along said communication network toward said central recording unit in the form of seismic data packets, each seismic data packet being time stamped with the time of the first clock means respective to the particular data acquisition module source of said seismic data packet when said seismic data is received by said particular data acquisition module from the seismic sensors connected thereto (Column 3, Lines 10-25; Column 5, Line 52 to Column 6, Line 60).

With regard to claim 41, Fenton discloses that the time of said first clock means is synchronized to GPS reference time by said assisted GPS receiver (Column 5, Line 52 to Column 6, Line 60).

With regard to claim 44, Fenton discloses that said central recording unit transmits second clock synchronization signals corresponding to the time of said

second clock means for receipt and re-transmission along said communication network (Column 5, Line 52 to Column 6, Line 60; especially column 6, Lines 45-60).

With regard to claim 45, Fenton discloses that the time of said second clock means is synchronized to GPS satellite reference time by said master GPS receiver (abstract; Column 2; Column 3, Line 10 to Column 4, Line 14; Column 5, Line 52 to Column 6, Line 67), and said data acquisition modules comprise means responsive to a second clock synchronization signal to coordinate the time value of said first clock means to the time value of said second clock means (Column 6, Lines 1-60).

With regard to claim 51, Fenton discloses that said data acquisition and other data processing modules are equipped with means for receiving synchronization signals emanating from said central recording unit and determining time according to said second clock means, for retransmitting said synchronization signals and for annotating the second clock time on synchronization signals retransmitted by said modules (Column 6, Line 28 to Column 7, Line 11).

With regard to claim 52, Fenton discloses that said second clock means is a master clock of greater precision than said first clock means (Column 3).

With regard to claim 56, Fenton discloses that said master GPS receiver is utilized to communicate respective global-positioning system information to respective data acquisition modules over said seismic survey network and said assisted GPS receivers utilize said information to improve the accuracy of their computation of current time (Column 2; Column 3, Line 25 to Column 5, Line 52; Column 6, Line 60 to Column 7, Line 36).

With regard to claim 57, Fenton discloses that said master GPS receiver receives global-positioning-system information from said data acquisition modules over said seismic survey network, said information being utilized by said master GPS receiver to improve the accuracy of its computation of the positions of said data acquisition modules (Column 2; Column 3, Line 25 to Column 5, Line 52; Column 6, Line 60 to Column 7, Line 36).

Wit regard to claim 58, Fenton discloses that the information comprises accumulated received global- positioning-system signals and related data (Column 2; Column 3, Line 25 to Column 5, Line 52; Column 6, Line 60 to Column 7, Line 36).

With regard to claim 59, Fenton discloses that position coordinates of respective data acquisition modules computed by said master GPS receiver are communicated to said respective data acquisition modules by data packet communication over said communication network (Column 2; Column 3, Line 25 to Column 5, Line 52; Column 6, Line 60 to Column 7, Line 36).

With regard to claim 60, Fenton discloses that the assisted GPS receivers utilize said position coordinates to compute a best estimate of time utilizing signals they receive from one or more global-positioning-system satellites (Column 2; Column 3, Line 25 to Column 5, Line 52; Column 6, Line 60 to Column 7, Line 36).

With regard to claim 61, Fenton discloses that said master GPS receiver communicates information to said data acquisition modules over said communication network, said information being utilized by said assisted GPS receivers to improve their

satellite tracking processes (Column 2; Column 3, Line 25 to Column 5, Line 52; Column 6, Line 60 to Column 7, Line 36).

With regard to claim 62, Fenton discloses that said information includes the current and future locations and identifications of available satellites (Column 2; Column 3, Line 25 to Column 5, Line 52; Column 6, Line 60 to Column 7, Line 36).

With regard to claim 63, Fenton discloses that said assisted GPS receiver receives assistance in computing its position or time from said master GPS receiver, said assistance being enabled by data packet communication over said communication network (Column 2; Column 3, Line 25 to Column 5, Line 52; Column 6, Line 60 to Column 7, Line 36).

With regard to claim 64, Fenton discloses that said master GPS receiver communicates global-positioning-system information to said data acquisition module over said communication network, said information being utilized by said assisted GPS receiver to improve the accuracy of its computation of its own position (Column 2; Column 3, Line 25 to Column 5, Line 52; Column 6, Line 60 to Column 7, Line 36).

With regard to claim 65, Fenton discloses that said assisted GPS receiver relies on network-communicated assistance from said master GPS receiver to determine accurate time and/or position coordinates (Column 2; Column 3, Line 25 to Column 5, Line 52; Column 6, Line 60 to Column 7, Line 36).

With regard to claim 66, Fenton discloses a seismic survey network (abstract) comprising a plurality of data processing modules (DAU) and a central recording unit (Data Recording and Control); a first portion of said data processing modules including

seismic data acquisition modules having a first clock means (received timing signal from slave GPS) and an assisted global positioning system (GPS) receiver 6 (Column 3, Line 10 to Column 4, Line 14; Column 5, Line 62 to Column 6, Line 67); said central recording unit having a second clock means and a master global positioning system (GPS) receiver 3 (Column 3, Line 10 to Column 4, Line 14; Column 5, Line 62 to Column 6, Line 67); each of said data acquisition modules having one or more seismic sensors 8 with respective specific identities operatively connected thereto for transmission of seismic data to the respective data acquisition module (Column 3, Lines 10-25; Column 5, Line 52 to Column 6, Line 60); a communication network connected among said data processing modules and said central recording unit linking said master GPS receiver and said assisted GPS receivers (Figs. 1-2) (Column 3; Column 6), said master GPS receiver transmitting to said assisted GPS receiver over said communication network satellite tracking assistance data and current best-estimate data of said assisted GPS receiver location and said assisted GPS receiver transmitting to said master GPS receiver for processing and storage, over said communication network, satellite data collected by said assisted GPS receiver (Column 3, Line 10 to Column 5, Line 53; Column 6, Line 60 to Column 7, Line 36), said data acquisition modules having operational programs to convert instants of seismic data values at selected time intervals to signal transmissions in the form of digital seismic data packets that are respectively distinguished by the time of the first clock means at the instant that respective seismic data is received by a particular data acquisition module (Column 3, Lines 10-25; Column 5, Line 52 to Column 6, Line 60); seismic data packets generated

by said particular data acquisition module being transmitted along said communication network for receipt and re-transmission by at least one other data processing module prior to receipt by said central recording unit (Column 3, Lines 10-25; Column 5, Line 52 to Column 6, Line 60), said central recording unit having means to transmit master clock synchronization signals to said other data processing module and said other data processing module having means for re-transmission of said master clock synchronization signals along said communication network in a transmission direction opposite from said seismic data packets (Column 3, Lines 10-25; Column 5, Line 52 to Column 7, Line 11).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 42-43, 46-47, and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fenton as applied to claims 39-41, 44-45, 51-52, and 56-66 above and further in view of Bary.

With regard to claim 42-43, Fenton does not disclose that a second portion of said data processing modules are base line modules. Fenton discloses a seismic survey network of DAUs (Figs. 1-2) (Columns 1-3), but does not disclose any further processing modules in the network besides DAUs. Bary teaches a seismic survey

network made up of DAUs and other processing modules (Fig. 1) (abstract; Columns 6-10). Bary teaches that the other unit is a base line or line tap unit (RSS) (Fig. 1). When the devices are connected by cables, the RSS units are read as base line and line tap units since they collect data from a group of data acquisition modules and transmit it along a base line to the central recording station. It would have been obvious to modify Fenton to include other processing modules including base line units and line tap units as taught by Bary in order to be able to spread lines of the DAUs over a large geographical area and control the transmission of data from each line so that it reaches the central recording station.

With regard to claim 46, Fenton does not disclose that said communication network comprises a plurality of data transmission increments serially linking respective data acquisition modules, other data processing modules and said central recording unit, each of said increments having a predetermined data propagation time interval, the data propagation time intervals of data transmission increments adjacent each module and unit being programmed in the respective module and unit as a reference value for synchronizing the time reported by a first clock means to the time reported by said second clock means. Bary teaches a seismic survey network of DAUs that use GPS timing signals and a communication network between the data acquisition devices and a central control station (Fig. 1) (abstract; Columns 6-10). Bary teaches that the communication network comprises a plurality of data transmission increments serially linking respective data acquisition modules, other data processing modules, and the central recording unit, each of the increments having a predetermined data propagation

time interval, the data propagation time intervals of data transmission increments adjacent each module and unit being programmed in the respective module and unit as a reference value for synchronizing the time reported by the first clock means to the time reported by the second clock means (Column 1, Lines 15-31; Column 3, Lines 10-65; Column 4, Line 15-65). It would have been obvious to modify Fenton to include the transmission increments as taught by Bary in order to send data from each unit at a fixed time interval for recording at the central station.

With regard to claim 47, Fenton does not disclose that the specific identity of a seismic sensor source of a seismic data packet is implicitly distinguished by the sequential reception order of said seismic data packet by said central recording unit. Bary teaches that the specific identity of a seismic sensor source of a seismic data packet is implicitly distinguished by the sequential reception order of the data packet by a central recording unit in a seismic survey network comprising DAUs and GPS receivers for timing (Column 1, Lines 15-31). It would have been obvious to modify Fenton to include sending data packets from a specific seismic sensor source in a sequential reception order as taught by Bary in order to have fixed intervals during which data is sent to the central recording station.

With regard to claim 54, Fenton does not disclose that a second portion of said data processing modules includes third clock means of less precision than said master clock and of greater precision than said first clock means. Bary teaches a seismic survey network made up of DAUs and other processing modules (Fig. 1) (abstract; Columns 6-10). Bary teaches that the other unit is a base line or line tap unit (RSS)

(Fig. 1). When the devices are connected by cables, the RSS units are read as base line and line tap units since they collect data from a group of data acquisition modules and transmit it along a base line to the central recording station. Bary teaches that the network is made up of different levels of transmission devices that make up the processing modules, with RTU units connected to a higher level of RSS units connected to the CCU. Therefore, there would be three levels of clocks – RTU clocks, RSS clocks, and CCU clock. The CCU synchronizes the RSS units and synchronizes the RTU units through the RSS units. Therefore the third clock of the RSS units is more precise than the RTU clock since they are more complicated units and are used to synchronize the clocks of the RTU. The third clock is also less precise than the master clock since it is synchronized by the master clock. It would have been obvious to modify Fenton to include other processing modules with different precision clocks including base line units and line tap units as taught by Bary in order to be able to spread lines of the DAUs over a large geographical area and control the transmission of data from each line so that it reaches the central recording station.

Claims 39, 41-47, 52, 54, and 56-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bary in view of Ericsson.

With regard to claim 39, Bary discloses a seismic survey network. Bary discloses a plurality of data processing modules RTU,RSS (Fig. 1) and a central recording unit CCU. Bary discloses that a first portion of the data processing modules includes seismic data acquisition modules have a first clock means and an assisted

global positioning system receiver (Column 3, Lines 10-65; Columns 4-6; Column 8, Lines 33-45). Bary discloses means for detecting the time of arrival at each dependent station and counting means associated with the local clock for performing a second dating of the time of arrival in according with the external clock (GPS signal from satellite). Therefore, each dependent station has an internal clock and a receiver that communicated with the GPS satellite signals. In Fig. 1, Bary shows that all units in the system have a means for receiving the GPS satellite signal (H). This signal provides timing information, and therefore the device inside each of the units that receives the signal is a clock means that acquired the GPS timing signal. Bary discloses that the central processing data unit has a second clock means and a master global positioning system receiver (Column 3, Lines 10-65; Columns 4-5; Column 8, Lines 33-45; Column 9, Line 6 to Column 10, Line 21). Bary discloses that the CCU can also receive GPS signals, and therefore it has a GPS receiver. Bary discloses that the GPS signals are used by a processor and a clock (master clock) in the CCU for timing the data and for synchronization. Bary discloses each of the data acquisition modules RTU having one or more seismic sensors R with respective specific identities operatively connected thereto (Column 5, Line 61 to Column 6, Line 15) for transmission of seismic data to the respective data acquisition module. Bary discloses that the receivers R are separated into specific groups connected to different data acquisition units. Bary discloses the survey network further comprising a communication network (LAN) connected among the data processing modules and the central recording unit linking the master GPS receiver and the assisted GPS receivers (Column 3, Lines 10-65; Column 4, Line 58 to

Column 5, Line 22; Column 6). Bary does not disclose the master GPS receiver transmitting to the assisted GPS receivers over the communication network satellite tracking assistance data and current best-estimate data of the assisted GPS receiver location. Bary does not disclose the assisted GPS receiver transmitting to the master GPS receiver fro processing and storage, over the communication network, satellite tracking data collected by the assisted GPS receiver. Bary discloses that an external GPS satellite signal is provided to the units of the system. Bary discloses that the central station comprises a clock that is used as a master clock associated with the GPS timing signal by a GPS receiver to synchronize the system. Bary does not disclose that the master GPS receiver in the central recording unit obtains satellite tracking assistance data and best-estimate data of the assisted GPS receivers in the acquisition units and local concentration stations nor that the assisted GPS receivers send satellite information to the master GPS. Ericsson teaches a GPS network that uses a master GPS receiver in a base unit as a reference for assisted GPS units in the network (Fig. 2) (Pages 5-10). Ericsson teaches that the both the reference GPS unit and the GPS units in the network units provide satellite tracking and position updates to the other GPS units in the network to assist in obtaining the GPS signal from the satellites and transferring its information to the GPS receivers in the network (Pages 5-10). It would have been obvious to modify Bary, who relies on the GPS signal at each of the units in a seismic survey network, to include the assisted GPS technology taught by Ericsson in order to able to provide better coverage of the entire survey area with the

GPS satellite signals so that receivers that lose the signal due to terrain blockage can still be covered by the GPS signals.

With regard to claim 41, Bary discloses that the time of the first clock means is synchronized to GPS reference time by the assisted GPS receiver (Column 4, Lines 45-52).

With regard to claims 42-43, Bary discloses that the other unit is a base line or line tap unit (RSS) (Fig. 1). When the devices are connected by cables, the RSS units are read as base line and line tap units since they collect data from a group of data acquisition modules and transmit it along a base line to the central recording station.

With regard to claim 44, Bary discloses that the central recording unit transmits second clock synchronization signals corresponding to the time of the second clock means for receipt and re-transmission along the communication network (abstract; Columns 8-9).

With regard to claim 45, Bary discloses that the time of the second clock means is synchronized to GPS satellite reference time by the master GPS receiver (Column 4, Lines 25-35, 45-62) and that the data acquisition modules comprise means responsive to a second clock synchronization signal to coordinate the time of the first clock means to the time value of the second clock means (Column 3; Column 4, Line to Column 5, Line 21; Column 8 Line 15 to Column 9).

With regard to claim 46, Bary discloses that the communication network comprises a plurality of data transmission increments serially linking respective data acquisition modules, other data processing modules, and the central recording unit,

each of the increments having a predetermined data propagation time interval, the data propagation time intervals of data transmission increments adjacent each module and unit being programmed in the respective module and unit as a reference value for synchronizing the time reported by the first clock means to the time reported by the second clock means (Column 1, Lines 15-31; Column 3, Lines 10-65; Column 4, Line 15-65).

With regard to claim 47, Bary discloses that the specific identity of a seismic sensor source of a seismic data packet is implicitly distinguished by the sequential reception order of the data packet by the central recording unit (Column 1, Lines 15-31).

With regard to claims 52, Bary discloses that the second clock means is a master clock of greater precision than the first clock means (Column 5, Lines 1-21; Column 8, Lines 33-45; Columns 9-10). Bary discloses that the master clock (clock in the CCU) is responsible for creating the synchronization signal that synchronizes the clocks in the other units of the system. Therefore, the master clock is more precise since the other clocks are set according to its time.

With regard to claims 54, Bary discloses that each device in the network has a clock that is synchronized by the synchronization signal from the CCU and from GPS signals. The network is made up of different levels of transmission devices that make up the processing modules, with RTU units connected to a higher level of RSS units connected to the CCU. Therefore, there would be three levels of clocks – RTU clocks, RSS clocks, and CCU clock. The CCU synchronizes the RSS units and synchronizes the RTU units through the RSS units. Therefore the third clock of the RSS units is more

precise than the RTU clock since they are more complicated units and are used to synchronize the clocks of the RTU. The third clock is also less precise than the master clock since it is synchronized by the master clock.

With regard to claim 56, Bary discloses that the master GPS is utilized to communicate respective GPS information to respective data acquisition modules over the seismic survey network and the assisted GPS receivers use the information to improve their computation of the current time (abstract; Columns 3-4; Column 5, Lines 1-21, Column 8, Lines 34 to Column 10, Line 25).

With regard to claims 57-58, Bary does not disclose that the master GPS receiver utilizes global positioning information comprising accumulated GPS signals and related data sent by the data acquisition modules to improve the accuracy of its computation of their positions. Ericsson discloses the use of GPS satellites and receivers in a system with different levels. Ericsson discloses that positioning and timing data can be communicated through GPS signals from satellites, network nodes, and individual receivers (Fig. 2) (Pages 5-9). It would have been obvious to modify Bary to include using the position information sent among the network as taught by Ericsson to improve the positioning of the acquisition units by the CCU in order to generate a more detailed and precise map of where the seismic data was obtained.

With regard to claim 59, Bary does not disclose that position coordinates of the data acquisition modules computed by the master GPS receiver are communicated to the respective data acquisition module by data packet communication over the seismic network. Ericsson discloses that the position information in GPS networks using

assisted GPS receivers is sent in data packets over a network linking all devices containing GPS receivers and the GPS satellites (Figs. 2-4) (pages 5-9). It would have been obvious to modify Bary to include sending position coordinates computed by a master GPS over the network as taught by Ericsson in order to provide better GPS coverage for the entire terrain being surveyed.

With regard to claim 60, Bary does not disclose that the data acquisition modules use the position information to compute a best estimate of time utilizing signals they receive from GPS satellites. Ericsson discloses that an accurate time reference is an optional element of positioning assistance data. It would have been obvious to modify Bary to use this time reference in the positioning data as taught by Ericsson to provide a time reference to synchronize the time of the system.

With regard to claim 61, Bary does not disclose improving satellite tracking. Ericsson discloses that receivers on a base station (second receiver, CCU of Bary) are used to communicate information to individual units (assisted GPS receivers in acquisition modules of Bary) to improve satellite-tracking processes (Page 3 to Page 5). It would have been obvious to modify Bary to include communicating information to improve satellite tracking as taught by Ericsson so as to be able to continuously receive GPS signals for system timing purposes.

With regard to claim 62, Ericsson discloses that the information contains current and future locations and identifications of available satellites (Pages 1-6). Ericsson discloses that satellite locations are known and that the positions of satellites are sent

among the network in order to continuously receive GPS signals. If the position information of satellites were not distributed, then receivers would lose the GPS signal.

With regard to claim 63, Bary does not disclose global positioning receivers in the acquisition units (assisted receivers) receiving assistance in their position determinations. Ericsson discloses that individual receivers (assisted receivers) receive assistance in computing position and time from master GPS receivers by data packet communication (Fig, 2) (Page 5). It would have been obvious to modify Bary to include using the position information sent among the network as taught by Ericsson to improve the positioning of the acquisition units by the CCU in order to generate a more detailed and precise map of where the seismic data was obtained.

With regard to claims 64-65, Bary does not disclose utilizing GPS system information to improve accuracy of positioning computation by the data acquisition units which have assisted GPS receivers (receivers that receive signal H from satellites). Ericsson discloses that a master GPS receiver communicates GPS information to another module over a network, with the information being utilized by the module to improve accuracy of its computation of its own position (Pages 5-9) (Fig. 2). It would have been obvious to modify Bary to include using the GPS network of receivers on the CCU, RSS, and RTU in order to improve the accuracy of position determination as taught by Ericsson in order to generate a more detailed and precise map of where the seismic data was obtained.

With regard to claim 66, Bary discloses a seismic survey network (Fig. 1). Bary discloses a plurality of data processing modules (RTU, RRS) and a central recording

unit (CCU) (abstract). Bary discloses a first portion of the data processing modules including seismic data acquisition modules having a first clock means and an assisted GPS receiver (Column 3, Lines 10-65; Columns 4-6; Column 8, Lines 33-45). Bary discloses means for detecting the time of arrival at each dependent station and counting means associated with the local clock for performing a second dating of the time of arrival in according with the external clock (GPS signal from satellite). Therefore, each dependent station has an internal clock and a receiver that communicated with the GPS satellite signals. In Fig. 1, Bary shows that all units in the system have a means for receiving the GPS satellite signal (H). This signal provides timing information, and therefore the device inside each of the units that receives the signal is a clock means that acquired the GPS timing signal. Bary discloses that the central processing data unit has a second clock means and a master global positioning system receiver (Column 3, Lines 10-65; Columns 4-5; Column 8, Lines 33-45; Column 9, Line 6 to Column 10, Line 21). Bary discloses each of the data acquisition modules RTU having one or more seismic sensors R with respective specific identities operatively connected thereto (Column 5, Line 61 to Column 6, Line 15) for transmission of seismic data to the respective data acquisition module. Bary discloses that the receivers R are separated into specific groups connected to different data acquisition units. Bary discloses the survey network further comprising a communication network (LAN) connected among the data processing modules and the central recording unit linking the master GPS receiver and the assisted GPS receivers (Column 3, Lines 10-65; Column 4, Line 58 to Column 5, Line 22; Column 6). Bary does not disclose the master GPS receiver

transmitting to the assisted GPS receivers over the communication network satellite tracking assistance data and current best-estimate data of the assisted GPS receiver location. Bary does not disclose the assisted GPS receiver transmitting to the master GPS receiver fro processing and storage, over the communication network, satellite data collected by the assisted GPS receiver. Bary discloses that an external GPS satellite signal is provided to the units of the system. Bary discloses that the central station comprises a clock that is used as a master clock associated with the GPS timing signal by a GPS receiver to synchronize the system. Bary does not disclose that the master GPS receiver in the central recording unit obtains satellite tracking assistance data and best-estimate data of the assisted GPS receivers in the acquisition units and local concentration stations nor that the assisted GPS receivers send satellite tracking information to the master GPS. Ericsson teaches a GPS network that uses a master GPS receiver in a base unit as a reference for assisted GPS units in the network (Fig. 2) (Pages 5-10). Ericsson teaches that the both the reference GPS unit and the GPS units in the network units provide satellite tracking and position updates to the other GPS units in the network to assist in obtaining the GPS signal from the satellites and transferring its information to the GPS receivers in the network (Pages 5-10). It would have been obvious to modify Bary, who relies on the GPS signal at each of the units in a seismic survey network, to include the assisted GPS technology taught by Ericsson in order to able to provide better coverage of the entire survey area with the GPS satellite signals so that receivers that lose the signal due to terrain blockage can still be covered by the GPS signals. Bary discloses that the data acquisition modules include

operational programs to convert instants of seismic data values at predetermined time intervals to signal transmissions in the form of digital data packets that are respectively distinguished by the first clock time of the instant that the respective seismic data is received and by the specific identity of the seismic sensor source of the data (Column 1, Lines 18-41; Column 5, Line 55 to Column 7, Line 16; Columns 8-9). Bary discloses that data packets generated by a first data acquisition module are transmitted along a route that includes receipt and retransmission of the data packets by at least one other data processing module prior to receipt by the central processing unit (Column 6). Bary discloses that each RTU sends the seismic data through the network to an RRS processing module which then retransmits the data on to the central recording unit. Bary discloses that the central recording unit has means to transmit clock synchronization signals to the other data processing module and that the other data processing module has means for retransmission of the synchronization signals along the transmission route in a directions opposite from the data packets (Column 3 to Column 5, Line 22; Columns 9-10). Bary discloses that the seismic data is sent from the receivers up to the central control, and that the synchronization signal is sent in the opposite direction, from central control to the data acquisition units.

Claims 40 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bary in view of Ericsson as applied to claim 39 and further in view of Iseli.

With regard to claim 40, Bary discloses that the data acquisition modules include operational programs to receive and re-transmit seismic data along the communication

network toward the central recording unit in the form of seismic data packets (abstract; Fig. 1; Column 5, line 55 to Column 6). Bary does not specifically disclose each seismic data packet being time stamped with the time of the first clock means respective to the particular data acquisition module source of the seismic data packet when the seismic data is received by the particular data acquisition module for the seismic sensors connected thereto. Iseli discloses that seismic data sent from a data acquisition unit to a central recording unit have the time annotated onto the data packets ([0030]) and that these times are synchronized to a master clock and therefore the annotated time is the time of the second (master) clock ([0032]; [0045]; [0054-0056]). It would have been obvious to modify Bary to annotate the time from the second clock that is used to synchronize all clocks in the system as taught by Iseli in order to have the time of data acquisition for each signal present in the data packet so that data processing by time will be easier to perform in the central processing unit.

With regard to claims 51, Bary discloses creating digital data from the received seismic signals, but does not disclose specifically that the data packets correspond to the second time and have the second time annotated on the data packet. Iseli discloses that seismic data sent from a data acquisition unit to a central recording unit have the time annotated onto the data packets ([0030]) and that these times are synchronized to a master clock and therefore the annotated time is the time of the second (master) clock ([0032]; [0045]; [0054-0056]). It would have been obvious to modify Bary to annotate the time from the second clock that is used to synchronize all clocks in the system as taught by Iseli in order to have the time of data acquisition for each signal present in the

data packet so that data processing by time will be easier to perform in the central processing unit.

Conclusion

The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878.. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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SAH

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